



# Australian Bureau of Statistics

## 6345.0 - Wage Price Index, Australia, Sep 2016

Previous ISSUE Released at 11:30 AM (CANBERRA TIME) 16/11/2016

## Summary

### Main Features

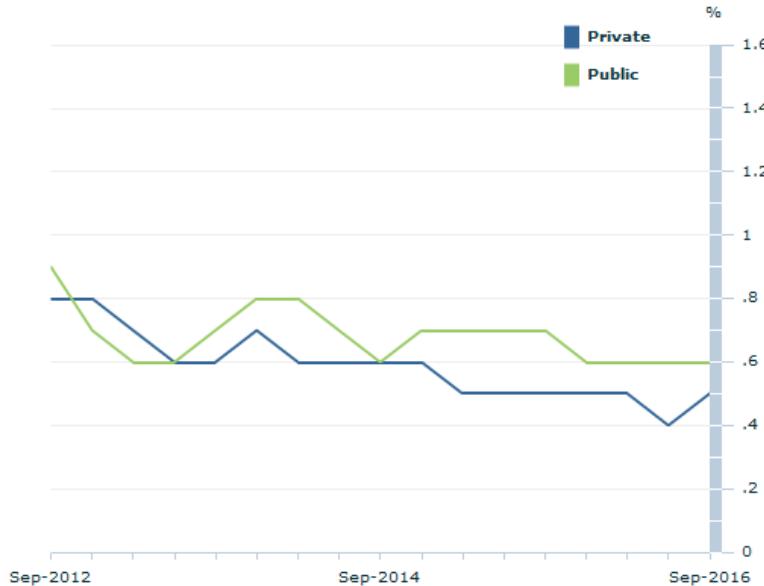
#### SEPTEMBER KEY FIGURES

	Jun Qtr 2016 to Sep Qtr 2016 % change	Sep Qtr 2015 to Sep Qtr 2016 % change
Wage Price Index (WPI) Total hourly rates of pay excluding bonuses		
Trend(a)		
Australia Sector		
	(c)0.4	1.9
	Private	0.5
	Public	0.6
Seasonally Adjusted(b)		
Australia Sector		
	0.4	1.9
	Private	0.4
	Public	0.6
Original		
Australia Sector		
	(c)0.7	2.0
	Private	0.8
	Public	0.9

(a) See Explanatory Notes paragraphs 39-40, 42. (c) See Explanatory Notes paragraph 27.

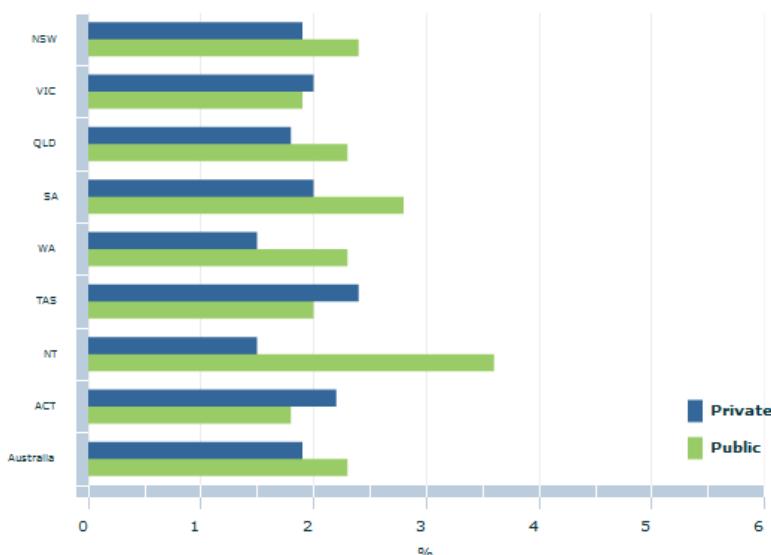
(b) See Explanatory Notes paragraphs 32-38, 42.

Quarterly changes, Trend, Total hourly rates of pay excluding bonuses



Source(s): Quarterly changes, Trend, Total hourly rates of pay excluding bonuses-Web Page Graph 1

**Annual change, Original, Total hourly rates of pay excluding bonuses - States & Territories**



Source(s): Annual change, Original, Total hourly rates of pay excluding bonuses - States and Territories-Web Page Graph 2 - Annual change Original

## SEPTEMBER KEY POINTS

### TOTAL HOURLY RATES OF PAY EXCLUDING BONUSES

#### QUARTERLY CHANGE (JUN QTR 2016 TO SEP QTR 2016)

- The trend index and the seasonally adjusted index for Australia both rose 0.4% in the September quarter 2016.
- The Private sector rose 0.4% and the Public sector rose 0.6%, seasonally adjusted.
- The rises in indexes at the industry level (in original terms) ranged from 0.1% for Mining to 1.7% for Accommodation and food services.

#### ANNUAL CHANGE (SEP QTR 2015 TO SEP QTR 2016)

- The trend and seasonally adjusted indexes for Australia both rose 1.9% through the year to the September quarter 2016.
- Rises in the original indexes through the year to the September quarter 2016 at the industry level ranged from 1.0% for Mining to 2.4% for Health care and social assistance.

## NOTES

### FORTHCOMING ISSUES

ISSUE (QUARTER)	Release Date
December 2016	22 February 2017
March 2017	17 May 2017
June 2017	16 August 2017
September 2017	15 November 2017

### CHANGES IN THIS ISSUE

This issue contains a feature article titled "The Size and Frequency of Wage Changes" which is based on the research undertaken by James Bishop, Research Economist, Reserve Bank of Australia on secondment to the ABS. The article explores some of the factors underpinning the decline in wage growth over recent years from analysis of micro level WPI data. The article is available on the ABS website <<https://www.abs.gov.au>>.

### CHANGES IN FUTURE ISSUES

The expenditure weights used to compile the WPI will be updated in the December quarter 2016 using expenditure on wages and salaries from the 2016 Survey of Employee Earnings and Hours.

### DATA REFERENCES

Data referenced in the Key Points and Commentary are available from the tables shown in this publication or in the corresponding tables of this publication on the ABS website <<https://www.abs.gov.au>>.

## **INQUIRIES**

For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070 or WPI on Perth (08) 9360 5151. The ABS Privacy Policy outlines how the ABS will handle any personal information that you provide to us.

## **Commentary**

### **COMMENTARY**

#### **WAGE PRICE INDEXES**

##### **Australia/Sector (seasonally adjusted)**

In the September quarter 2016, the Private sector index rose 0.4% and the Public sector rose 0.6%. The All sectors quarterly rise was 0.4%.

Through the year, All sectors rose 1.9%, a new low for the series. The Private sector through the year rise to the September quarter 2016 of 1.9% was lower than the Public sector rise of 2.3%.

##### **Australia/Sector (original)**

September quarter wages growth was mainly influenced by increases to the national minimum wage and modern awards; regularly scheduled enterprise agreement increases; and salary reviews timed to coincide with the financial year. Of note, the 2015-16 Fair Work Commission decision increased the minimum wage and modern awards by 2.4%.

In the September quarter 2016, wages grew 0.7% for All sectors. Wages grew 0.8% in the Private sector and 0.9% in the Public sector.

The All sectors through the year rise was 2.0%. The Private sector rose 1.9% for the second quarter in a row, continuing the lowest through the year rise since the beginning of the series in September 1998. The Public sector rose 2.3%.

##### **State/Territory (original)**

In the September quarter 2016, the largest quarterly rise of 1.1% was recorded by Tasmania and the Northern Territory. The lowest quarterly rise of 0.5% was recorded by the Australian Capital Territory.

Rises through the year ranged from 1.7% for Western Australia to 2.3% for South Australia.

In the Private sector, the quarterly rise of 1.2% for Tasmania was the highest quarterly rise of all states and territories. The lowest quarterly rises of 0.4% was recorded by Western Australia.

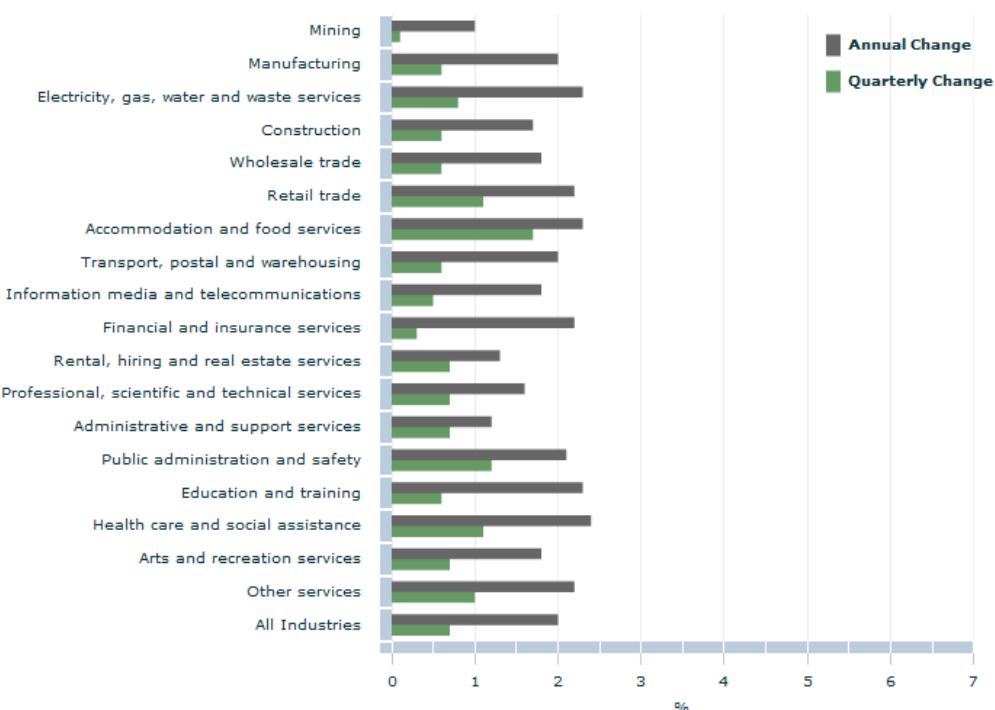
Rises through the year in the Private sector ranged from 1.5% for Western Australia and the Northern Territory to 2.4% for Tasmania. Western Australia has recorded through the year growth of less than 2.0% since March quarter 2015.

In the Public sector, the Northern Territory recorded the highest quarterly rise (2.0%) of all states and territories. This was the largest rise for the Northern Territory since the December quarter 2009. Queensland and the Australian Capital Territory recorded 0.2%, the lowest of all states and territories. Changes in the timing of pay increases awarded under enterprise agreements can influence quarterly wages growth.

The Northern Territory recorded the highest through the year Public sector rise of all states and territories (3.6%) and Australian Capital Territory recorded the lowest (1.8%).

##### **Industry (original)**

Annual & Quarterly changes, Original, Total hourly rates of pay excluding bonuses - Industry



**Source(s):** Annual and Quarterly changes, Original, Total hourly rates of pay excluding bonuses - Industry-Web Page Graph 3 - Annual and Quarterly changes Original by Industry

In the Private sector, Accommodation and food services recorded the highest quarterly rise of 1.7% and Mining the lowest growth over the quarter (0.1%). Rises through the year in the Private sector ranged from 1.0% for Mining to 2.5% for Electricity, gas, water and waste services.

Two Private sector industries recorded the lowest through the year growth since the start of the WPI: Mining; and Administrative and Support Services. Other resource related industries such as Construction and Professional, scientific and technical services recorded low through the year growth 1.7% and 1.6%, respectively, in the current quarter.

In the Public sector, Public administration and safety recorded the highest quarterly rise of 1.1%. Electricity, gas, water and waste services, Professional, scientific and technical services and Education and training recorded the lowest wages growth of 0.6%. Rises through the year in the Public sector ranged from 1.2% for Professional, scientific and technical services to 2.4% for Education and training.

## Use of Price Indexes in Contracts

### USE OF PRICE INDEXES IN CONTRACTS

Price indexes published by the Australian Bureau of Statistics (ABS) provide summary measures of the movements in various categories of prices over time. They are published primarily for use in Government economic analysis. Price indexes are also often used in contracts by businesses and government to adjust payments and/or charges to take account of changes in categories of prices (Indexation Clauses).

Prices Indexes and Inflation contains a page Use of Price Indexes in Contracts that sets out a range of issues that should be taken into account by parties considering including an Indexation Clause in a contract using an ABS published price index.

## Frequently Asked Questions

### FREQUENTLY ASKED QUESTIONS

The Wage Price Index FAQs page has answers to a number of common questions to do with price indexes and the Wage Price Index, in particular.

## About this Release

The Wage Price Index measures changes in the price of labour services resulting from market pressures, and is unaffected by changes in the quality or quantity of work performed. It is unaffected by changes in the composition of the labour force, hours worked, or changes in characteristics of employees (e.g. work performance). Information about the wage price indexes has been released for each quarter since September 1997. Individual indexes are published for various combinations of state and territory, public and private sectors, and broad industry groups.

## The Size and Frequency of Wage Changes (Feature Article)

### FEATURE ARTICLE: THE SIZE AND FREQUENCY OF WAGE CHANGES

By James Bishop, Research Economist, Reserve Bank of Australia (on secondment to the ABS)

#### INTRODUCTION

The decline in wage growth over recent years has been one of the most important developments in the Australian economy. This article explores some of the factors underpinning this decline by analysing the job-level micro data from the Wage Price Index (WPI). In particular, it decomposes aggregate wage growth, as measured by the WPI, into the frequency and size of wage changes.

This work is the result of collaboration between the ABS and the Reserve Bank of Australia (RBA). Some of these results have already been previewed in a speech by the Governor of the RBA on 18 October 2016 and in the RBA's November 2016 *Statement on Monetary Policy* (footnote 1) . This article presents some additional analysis and incorporates the September quarter 2016 outcome for the WPI.

#### BACKGROUND

The level of wage growth is an important indicator of inflationary pressure in the economy and is a key driver of growth in household income. As such, the level of wage growth has important implications for the macroeconomy. Wage growth has declined markedly in recent years. The seasonally adjusted WPI rose by only 1.9% over the previous year, according to September quarter 2016 figures released today by the ABS, compared to growth rates of 3.8% in mid-2012.

One way to shed light on the decline in wage growth is by using the job-level micro data from the WPI. To compile the WPI, the ABS collect data on around 18,000 different jobs. These jobs are followed every quarter for a number of years and the ABS devote substantial resources to ensuring that wage changes for individual jobs are accurately reported and reflect market forces rather than changes in the quality and quantity of the work performed.

This article explores one way in which these job-level data can help us understand recent developments in wage growth. It begins with a simple decomposition. This decomposition is based on the notion that there are two ways in which firms can achieve a given reduction in wage growth. The first is by reducing the average size of the wage increases they pay. The second is by reducing the frequency of those wage rises. This article quantifies the relative importance of these two margins of adjustment to the recent decline in aggregate wage growth. It then shows which parts of the wage growth distribution have played the largest role in driving these shifts.

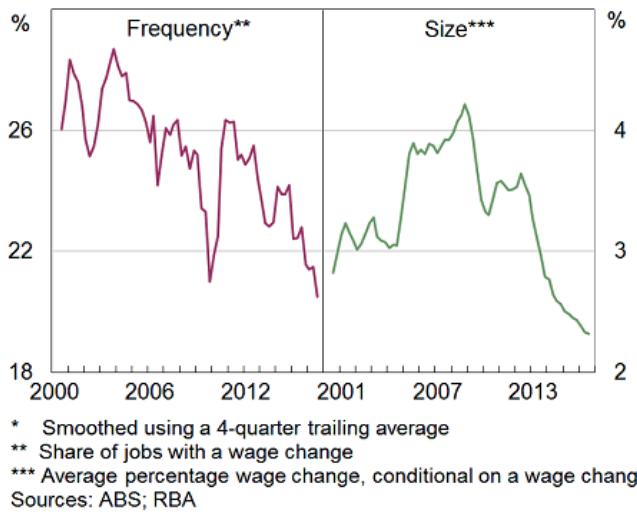
#### ANALYSIS

##### Frequency and size of wage changes

Using the WPI job-level data, it is possible to decompose aggregate wage growth into the frequency and size of wage changes (see Appendix 1 for details). The 'frequency' is the share of jobs that experience a wage change in a given quarter, while 'size' is the average magnitude of wage increases for those wages that do change.

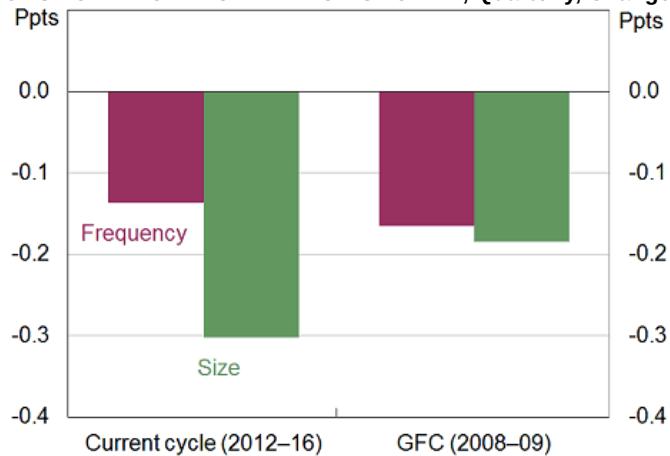
The average frequency and the average size of wage changes have both fallen since 2012 (Graph 1). The frequency of wage adjustment is currently at its lowest level since at least 2000, with around 21% of all wages being adjusted each quarter, compared with 25% in 2012 (footnote 2). This implies that the average length of time between wage changes has risen from once every 4 quarters in 2012 to once every 4½ quarters in 2016. This fall in the average frequency could reflect more wage freezes or longer delays in renegotiating wage contracts (footnote 3).The average size of wage changes (conditional on a wage change) has fallen from 3.6% in 2012 to 2.3% in 2016 and is now well below its 2000s average.

**GRAPH 1 – FREQUENCY AND SIZE OF WAGE CHANGES, Quarterly\***



To quantify the relative importance of these two developments, Graph 2 decomposes the change in quarterly wage growth between 2012 and 2016 into the contributions of frequency and size (see Appendix 1 for details). For comparison, it also shows the respective contributions to the peak-to-trough decline in wage growth during the Global Financial Crisis (GFC), which is the other major decline in wage growth in the WPI data.

**GRAPH 2 – CONTRIBUTIONS TO THE CHANGE IN WAGE GROWTH, Quarterly, Change relative to previous peak**



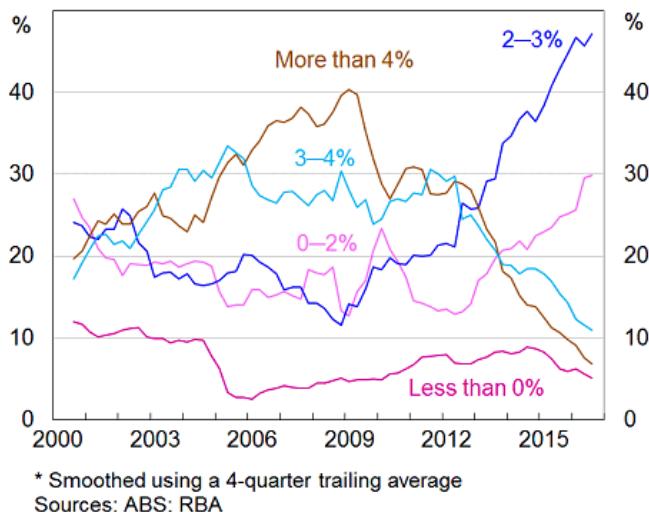
Sources: ABS; RBA

The decomposition shows that the declining size of wage rises has contributed more than two-thirds of the overall fall in wage growth since 2012 (Graph 2). The reduction in the frequency of wage adjustment has contributed the remainder. A similar pattern is also apparent across both the private and public sectors individually. In contrast, the adjustment in wage growth during the GFC reflected a 50–50 split between frequency and size. The larger role of the frequency margin during the GFC was in part due to the Australian Fair Pay Commission's decision to freeze the Federal Minimum Wage and award wages in 2009. The decline in the average size of wage increases since 2012 has been larger than the adjustment during the GFC.

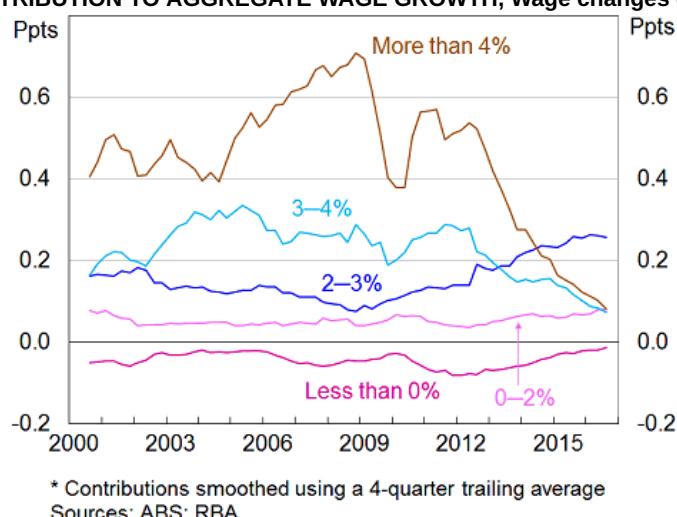
#### Fewer large wage rises

The main driver behind the recent fall in the average size of wage rises has been a substantial reduction in 'large' wage rises. The share of wage changes that were greater than 4% fell from around 29% in 2012 to 7% in 2016 (Graph 3). The share of jobs in this category has a disproportionately large effect on aggregate wage growth because the average wage rises in this category tend to be relatively large. To see this, Graph 4 shows the contributions of five wage growth categories to aggregate wage growth over time. These contributions capture two things: (i) the fraction of jobs receiving a wage increase in each range and (ii) the average size of those wage increases (see Appendix 2 for details).

**GRAPH 3 – WAGE CHANGES OF DIFFERENT SIZES, Share of jobs that experience a wage change\***



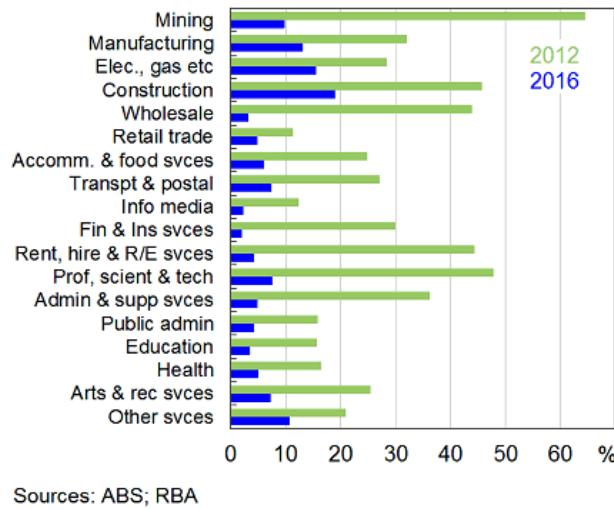
**GRAPH 4 – CONTRIBUTION TO AGGREGATE WAGE GROWTH, Wage changes of different sizes\***



In addition to the declining share of wage changes that are larger than 4% (Graph 3), the average size of those increases has fallen from 7½% in 2012 to 5¾% in 2016, which has weighed on aggregate wage growth. While the share of wage increases of between 3% and 4% has also fallen since 2012, this has had less of an effect on aggregate wage growth (footnote 4). The share of wage rises between 2% and 3% has more than doubled since 2012 and now accounts for almost half of all wage changes. The share of jobs receiving a rise of 0–2% has also grown, while the proportion of jobs experiencing wage falls has remained broadly stable.

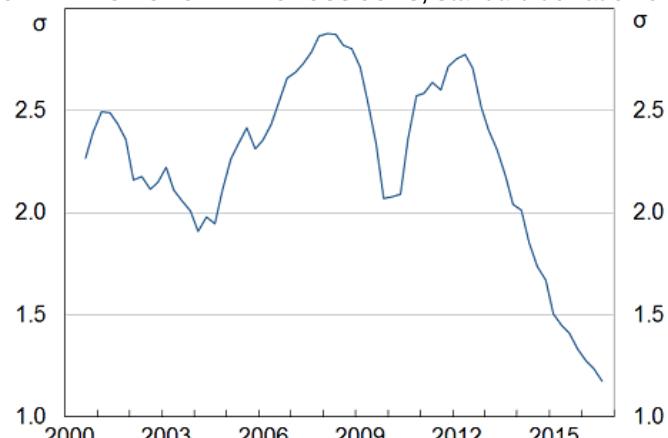
The declining share of 'large' rises has been apparent across all industries, though the shift has been largest in mining and the industries exposed to mining, such as construction and professional, scientific and technical services (Graph 5). This has contributed to a substantial fall in the dispersion – or standard deviation – in wage growth across jobs in the economy (Graph 6). During the resources boom, there was a high dispersion in wage growth across jobs, with especially strong growth in jobs exposed to mining and weaker growth in the many other parts of the economy. The reduction in the dispersion of wage growth over recent years also reflects the presence of 'downward nominal wage rigidity' – namely, an unwillingness or inability on the part of firms to reduce nominal wages. As the average level of wage growth falls, the share of firms that desire to cut wages, but are unable to because of rigidities, rises. This can lead to a compression in the distribution of wage growth as the mean of the distribution falls (footnote 5).

**GRAPH 5 – SHARE OF WAGE RISES LARGER THAN 4%, By Industry**



Sources: ABS; RBA

GRAPH 6 – DISPERSION IN WAGE GROWTH ACROSS JOBS, Standard deviation of quarterly growth rate\*



\* Smoothed using a 4-quarter-trailing average  
Sources: ABS; RBA

## CONCLUSION

Wage growth has declined markedly in recent years. Analysis of the micro-level WPI data indicates that this reflects both a decline in the frequency of wage increases and in the average size of the increases. In particular, the share of jobs that experienced wage growth in excess of 4% has fallen sharply since 2012.

## FOOTNOTES

1 Lowe's (2016) summary of this analysis and the November 2016 Statement on Monetary Policy did not incorporate data from the September 2016 release of the WPI. [back](#)

2 In this analysis, any wage changes of less than or equal to 0.1% (in absolute value) are classified as having a zero change, given that such small changes are more likely to reflect rounding than a true change in wages. For this reason, as well as several other factors, there will be slight differences between the level of wage growth implied by Graphs 1 and 4 and the headline WPI series contained in this publication. [back](#)

3 Renegotiation lags matter because wages are often frozen during the negotiation period. It is difficult to disentangle the impact of renegotiation lags and other (more explicit) forms of wage freezes using the WPI data. The decline in average frequency could also reflect a longer-run shift towards contracts that make less frequent wage adjustments. [back](#)

4 The 3–4% wage range includes wage increases of exactly 4%, but excludes wage increases of exactly 3%. A similar rule is used for the 2–3% category. The 0–2% category includes wage increases larger than 0.1% but smaller than or equal to 2%, while the 'less than 0%' category' includes all wage movements less than -0.1%. [back](#)

5 The correlation between the standard deviation and the mean of wage growth over the sample period is 0.78, suggesting that dispersion rises with the rate of wage inflation, as predicted by downward nominal wage rigidity effects. Downward nominal wage rigidity is also the most likely explanation for the decline in the frequency of wage adjustment over recent years. [back](#)

## APPENDIX 1: THE CONTRIBUTIONS OF FREQUENCY AND SIZE

Aggregate wage growth  $\Delta w_t$  at a point in time can be expressed as the weighted-average wage growth of each job in the WPI survey,

$$\Delta w_t = \sum_i \omega_{it} \Delta w_{it}$$

where  $\Delta w_{it}$  is the percentage wage change for job i in quarter t and  $\omega_{it}$  is the WPI weight of job i in quarter t ( $\sum_i \omega_{it} = 1 \forall t$ ). Using a simple identity, it is then possible to decompose wage inflation into two terms measuring frequency and size, respectively,

$$\Delta w_t = \underbrace{\sum_i \omega_{it} I(\Delta w_{it} \neq 0)}_{\text{Frequency}} \cdot \frac{\sum_i \omega_{it} \Delta w_{it}}{\sum_i \omega_{it} I(\Delta w_{it} \neq 0)}$$

where  $I(\cdot)$  is an indicator function that takes the value of one when its argument is true i.e. when job i experiences a wage change in quarter t. The 'frequency' term measures the fraction of jobs that experience a change in wages in quarter t, while the 'size' term is the average magnitude of wage increases for those wages that do change.

Using this identity, it is possible to decompose the change in the level of wage growth between 2012 and 2016 as,

$$\Delta w_{2016} - \Delta w_{2012} = F_{2016} S_{2016} - F_{2012} S_{2012}$$

where  $F_t$  and  $S_t$  are the contributions of frequency and size to wage growth in year t, respectively. To examine the contribution of frequency to the change in wage growth between 2012 and 2016, the size effect can be removed by holding the average size of wage increases constant at its average level in 2012 and 2016,

$$F_{2016} \frac{(S_{2016} + S_{2012})}{2} - F_{2012} \frac{(S_{2016} + S_{2012})}{2}$$

Similarly, the contribution of the size of wage increases can be estimated by holding frequency constant,

$$\frac{(F_{2016} + F_{2012})}{2} S_{2016} - \frac{(F_{2016} + F_{2012})}{2} S_{2012}$$

## APPENDIX 2: CONTRIBUTION OF WAGE CHANGES OF DIFFERENT SIZES

Aggregate wage growth can be decomposed into terms due to wage increases of different magnitudes using the following equation,  $\Delta w_t = F_t^{\text{cut}} \cdot S_t^{\text{cut}} + F_t^{0.1} \cdot S_t^{0.1} + F_t^{1.2} \cdot S_t^{1.2} + F_t^{2.3} \cdot S_t^{2.3} + F_t^{3.4} \cdot S_t^{3.4} + F_t^{4\_plus} \cdot S_t^{4\_plus}$

where, for example,  $F_t^{0.1}$  is the fraction of jobs that receive an increase of 1–2% in period t and  $S_t^{0.1}$  is the average size of those increases.

## REFERENCES

Reserve Bank of Australia, 2016, Statement on Monetary Policy, November

Lowe, P 2016, 'Why Is Inflation So Low?' Speech at Citi's 8th Annual Australian & New Zealand Investment Conference, Sydney

Wage Price Index, Australia, September 2016 (cat. no. 6345.0).

# Explanatory Notes

## Explanatory Notes

### EXPLANATORY NOTES

#### INTRODUCTION

1 This publication contains indexes measuring changes in the price of wages and salaries in the Australian labour market.

2 The methodology used to construct the WPIs is similar to that used for other price indexes such as the Consumer Price Index. In the Wage Price Index (WPI), index numbers are compiled using information collected from a representative sample of employee jobs within a sample of employing organisations. Individual indexes are compiled for various combinations of state/territory, sector (private/public) and industry division. Industry is classified according to the **Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006** (cat. no. 1292.0). For more detailed information on the methodology used in the construction of the WPI, refer to **Wage Price Index: Concepts, Sources and Methods** (cat. no. 6351.0.55.001).

#### CURRENT PUBLISHED INDEXES

3 Four WPIs are constructed and published quarterly. These indexes were first compiled for the September quarter 1997, and cover:

- ordinary time hourly rates of pay excluding bonuses index
- ordinary time hourly rates of pay including bonuses index
- total hourly rates of pay excluding bonuses index

- total hourly rates of pay including bonuses index.  
In these indexes the term 'bonuses' refers to bonuses and commissions.

## DESIGN OF THE INDEXES

### BROAD DESCRIPTION

**4** The WPIs measure changes over time in the price of wages and salaries unaffected by changes in the quality or quantity of work performed. A range of procedures have been developed to identify and measure quality and quantity changes and ensure that only pure price changes are reflected in the indexes.

**5** Price-determining characteristics of the jobs are fixed to ensure that changes in these characteristics do not contribute toward index movements. The following are examples of changes in price-determining characteristics which are not reflected in index movements:

- changes in the nature of work performed (e.g. different tasks or responsibilities)
- changes in the quantity of work performed (e.g. the number of hours worked)
- changes in the characteristics of the job occupant (e.g. age, apprenticeship year, successful completion of training or a qualification, grade or level, experience, length of service, etc.)
- changes in the location where the work is performed.

**6** Changes in the price of wages and salaries resulting from changes in the composition of the labour market are also excluded from index movements. To achieve this, a longitudinal survey methodology is used to measure a similar sample of jobs over time. Once a business is selected in the sample, it will be expected to provide data for a sample of jobs for a minimum of five years.

### WAGE PRICE INDEXES

**7** The **ordinary time hourly rates of pay indexes** that **exclude bonuses** measure quarterly changes in ordinary time hourly wage and salary rates. Changes in rates of pay reflected in these indexes (i.e. pure price changes) arise from a range of sources including award variations, enterprise and workplace agreements, minimum wage setting, individual contracts and informal arrangements.

**8** These indexes are not affected by changes in:

- penalty payments for overtime, shifts, weekends and public holidays (which fluctuate depending on the number of hours paid at penalty rates)
- allowances which fluctuate (such as those paid according to how much work is performed under special work conditions e.g. height, dirt, heat allowances)
- bonus payments (which may, or may not, relate to an individual's work performance). These payments are specifically excluded when calculating ordinary time hourly wage and salary rates.

**9** The effect of rolling ordinary time penalty payments and allowances into ordinary time hourly rates is excluded from these indexes. However, when overtime penalty payments and non-separable shift allowances are rolled into ordinary time hourly rates, the ordinary time indexes will increase accordingly.

**10** The **total hourly rates of pay indexes** that **exclude bonuses** are based on a weighted combination of ordinary time hourly wage and salary rates (described in paragraphs 7 and 8) and overtime hourly rates. As a result, the total hourly rates of pay indexes reflect changes in both the ordinary time and overtime hourly rates. However, the effect of changes in the amount of overtime paid at each overtime rate is not shown in these indexes.

**11** Only those indexes that exclude bonuses and commissions are pure price indexes because bonus and commission payments can reflect changes in the quality of work performed. No attempt is made to remove this quality element from the indexes that include bonuses and commissions.

### SCOPE AND COVERAGE

**12** The target population of employers for the WPIs are all employing organisations in Australia (private and public sectors) except:

- enterprises primarily engaged in agriculture, forestry or fishing
- private households employing staff
- foreign embassies, consulates, etc.

**13** A sample redesign was undertaken and the outcome implemented from the December quarter 2009. A result of this review was to stop collecting data on a quarterly basis from micro businesses (0-4 employment). The size and frequency of pay changes for jobs in micro businesses was found to be the same as businesses with employment of five or more. Therefore, micro businesses are now treated as being out of coverage but remain in scope through their continued inclusion in the expenditure weights used in compiling the WPIs. The introduction of this change does not impact what the indexes are measuring.

**14** All employee jobs in the target population of employers are in scope of the WPIs, except the following:

- Australian permanent defence force jobs
- non-salaried directors
- proprietors/partners of unincorporated businesses
- persons paid by commission only
- working proprietors/owner managers of Pty Ltd companies
- employees on workers' compensation who are not paid through the payroll
- 'non-maintainable' jobs (i.e. jobs that are expected to be occupied for less than six months of a year)
- jobs for which wages and salaries are not determined by the Australian labour market (e.g. most employees of Community Development Employment Programs, or jobs where the remuneration is set in a foreign country).

**15** As such, full-time, part-time, permanent, casual, managerial and non-managerial jobs are in scope. Costs incurred by employers for work undertaken by self-employed persons such as consultants and subcontractors are out-of-scope, as they do not relate to employee jobs.

## DATA COLLECTION

**16** Information for the WPI is collected each quarter by mail questionnaires from a sample survey of private and public sector employers selected from the ABS Business Register. The survey reference date is the last pay period ending on or before the third Friday of the middle month of the quarter. Data for bonuses are collected in respect to those bonuses paid during the three month period ending on the third Friday of the middle month of the quarter.

**17** In the first quarter they participate in the survey, each employer selects a sample of jobs from their workplace(s) using sampling instructions provided by the ABS, and provides information for these jobs, including detailed pricing specifications. In subsequent quarters survey respondents are asked to provide details of payments made to the current occupants of these same jobs. It is essential that the same jobs are priced in successive quarters, whether the individual job occupants are the same or not. Approximately 18,000 matched jobs are priced each quarter from the selected employers.

**18** The sampling method retains the highest possible common sample of employers over time, and retains the same sampled jobs within those employers where possible. However, it is also necessary to ensure the WPIs continue to be relevant and representative over time. For these reasons, the employer sample is refreshed annually (for the December quarter) in a way that ensures a high proportion of common selections while allowing new employers to be represented in the sample. Refreshing the sample also allows the ABS to control the length of time that small businesses are included in the sample.

**19** Between each annual refresh of the employer sample, a small number of employee jobs will be lost from the survey sample because of the closure of some businesses. In addition, some jobs in continuing businesses will be replaced in the sample because of restructuring and other job changes.

## WEIGHTING

**20** Expenditure weights are a measure of the relative importance of each elementary aggregate (EA), based on employers' expenditure on wages and salaries. Below the EA level, sample weights applied to each job on the WPI survey indicate the number of jobs in the Australian labour market a particular sampled job represents.

**21** Businesses selected in the WPI are assigned sample weights according to the number of similar businesses they represent in their state, industry and sector. Jobs are assigned sample weights according to the number of jobs they represent in that business. The total sample weight for a job is determined by multiplying business and job sample weights together. This total sample weight is the number of jobs in the Australian labour market a particular sampled job represents.

**22** The total employment figures for each business in the WPI survey are obtained from providers each September quarter. Job weights are updated based on these employment data and applied to the WPI sample each December quarter. These actions ensure the WPI sample remains representative.

**23** Expenditure weights are updated to reflect changes in employers' expenditure patterns on wages and salaries. Once updated, the weights are fixed again, and a new weighting reference period is created. In the following quarters, prices will be compared using this new weighting reference period. This process is referred to as reweighting. Reweighting ensures the index remains relevant.

**24** The December quarter 2014 weight update uses wages and salaries expenditure sourced from the 2014 Survey of Employee Earnings and Hours. These data are price updated to represent current period values. The new weights are available in the Appendix. The next weight update will occur in the December quarter 2016.

**25** When the expenditure weights are updated, the published index numbers will not recommence at 100.0. The series based on the old expenditure weights and that based on the new weights are linked to form a continuous series.

## INTERPRETATION OF INDEX NUMBERS

**26** Index numbers in this publication measure changes in the price of wages and salaries between the commencement of the series and a later period. Index number levels cannot be compared across states/territories as they do not provide comparative information on the relative levels of labour costs. Similarly, index number levels cannot be compared across sectors or industries. The usefulness of index numbers stems from the fact that index numbers for any two periods can be used to directly calculate the change or movement in the price of labour between the two periods. These **movements** can be compared across states/territories, sectors or industries.

## PERCENTAGE CHANGE AND ROUNDING

**27** The published index numbers have been rounded to one decimal place, and the percentage changes (also rounded to one decimal place) are calculated from the rounded index numbers. In some cases, this can result in the percentage change for the total level of a group of indexes being outside the range of the percentage changes for the component level indexes. Seasonally adjusted and trend quarterly estimates are calculated from unrounded original indexes. The percentage changes (rounded to one decimal place) are calculated from the rounded index numbers.

## INDEX MOVEMENTS

**28** Movements in indexes from one period to another can be expressed either as changes in index points or as percentage changes. In this publication, percentage changes are calculated to illustrate three different kinds of movements in indexes:

- movements between consecutive quarters
- movements between corresponding quarters of consecutive years (i.e. changes 'through the year')
- movements between consecutive financial years.

**29** The following example illustrates the method of calculating changes in index points and percentage changes between any two periods:

**Total hourly rates of pay excluding bonuses**, All Sectors, Australia Index numbers, trend (see table 1)  
September quarter 2016 124.4

**less** September quarter 2015 122.1

Change in index points 2.3

Percentage change  $2.3/122.1 \times 100 = 1.9\%$

## FINANCIAL YEAR INDEXES

**30** Index numbers for financial years are calculated as simple (arithmetic) averages of the four quarterly index numbers for the financial year. As the WPIs were first produced for the September quarter 1997, the first financial year index number that can be calculated is for 1997-98. Consequently, the first percentage change between financial years that can be calculated is between 1997-98 and 1998-99. The following example illustrates the method of calculating the financial year index number for 2015-16:

**Total hourly rates of pay excluding bonuses**, All Sectors, Australia Index numbers, original (see table 2)

September quarter 2015 122.2

**plus** December quarter 2015 122.7

**plus** March quarter 2016 123.2

**plus** June quarter 2016 123.7

Financial year 2015-16  $491.8/4 = 123.0$

**31** Percentage changes between the index numbers for any two financial years can be calculated using the method outlined in paragraph 29 above.

## SEASONALLY ADJUSTED INDEXES

**32** Seasonally adjusted estimates are derived by estimating and removing systematic calendar related effects from the original series. In most economic data these calendar related effects are a combination of the classical seasonal influences (e.g. the effect of the weather, social traditions or administrative practices) plus other kinds of calendar related variations, such as the number of trading days, Easter or the proximity of significant days in the year (e.g. Christmas). In the seasonal adjustment process, both seasonal and other calendar related factors evolve over time to reflect changes in activity patterns. The seasonally adjusted estimates reflect the sampling and non-sampling errors to which the original estimates are subject.

**33** The **total hourly rates of pay excluding bonuses index** is the only index of the WPI that is seasonally adjusted. Institutional effects largely drive the seasonality of this index. Important factors in determining this seasonality are the timing of effect of agreements, the length of these agreements, and the timing of the implementation of significant wage determinations that impact on rates of pay. A significant institutional change in wage setting arrangements can affect the relative level (or trend) and seasonality of the index.

**34** Prior to 2006, the Australian Industrial Relations Commission (AIRC) handed down annual Safety Net Review (SNR) decisions which set federal full-time minimum award rates. Since the commencement of the WPI, the SNR has contributed to the level of the index. Most of its impact on the WPI was in the September quarter with some residual effect in the December quarter each year. This impact contributed to the level of seasonality for those quarters. As a result of industrial relations changes associated with Work Choices there was no SNR decision in 2006. The setting of federal minimum wage rates became the responsibility of the Australian Fair Pay Commission (AFPC).

**35** The AFPC's first decision was handed down on 26 October 2006 with a date of effect of 1 December 2006. The impact on the WPI of the first AFPC ruling was mainly in the March quarter 2007. From 2007 to 2009, AFPC determinations impacted the December quarter WPI.

**36** On 1 July 2009 Fair Work Australia (FWA) began operations as part of a new national workplace relations system underpinned

by the Fair Work Act 2009. In June 2010 FWA announced its first annual minimum wage decision and the increase impacted the WPI in the September quarter 2010. Since 2010, minimum wage decisions have taken effect in the September quarter of each year and have resulted in a change of seasonality. To account for the change in timing, the seasonally adjusted and trend series were reanalysed in the September quarter 2010 to remove the influence of the different timing of minimum wage decisions in any year on the WPI.

## CONCURRENT SEASONAL ANALYSIS

**37** The WPI uses a concurrent seasonal adjustment methodology to derive the adjustment factors. This method uses the original time series available at each reference period to estimate seasonal factors for the current and previous quarters. Concurrent seasonal adjustment is technically superior to the more traditional method of reanalysing seasonal patterns once each year because it uses all available data to fine tune the estimates of the seasonal component each quarter. With concurrent analysis, the seasonally adjusted series are subject to revision each quarter as the estimates of the seasonal factors are improved. In most instances, the only significant revisions will be to the combined adjustment factors for the previous quarter and for the same quarter in the preceding year as the reference quarter (i.e. if the latest quarter is  $Q_t$  then the most significant revisions will be to  $Q_{t-1}$  and  $Q_{t-4}$ ). Seasonal patterns are also reanalysed when there are known changes to regular events. This can lead to additional revisions.

## ARIMA MODELLING

**38** The ABS uses Autoregressive Integrated Moving Averages (ARIMA) modelling techniques to produce seasonally adjusted estimates. ARIMA modelling is a technique that can be used to extend original estimates beyond the end of a time series. The extended values are temporary, intermediate values that are used internally to improve seasonal adjustment. They do not affect the original estimates and are discarded at the end of the seasonal adjustment process. The use of ARIMA modelling generally results in a reduction in revisions to the seasonally adjusted estimates when subsequent data becomes available. ARIMA modelling in the WPI was introduced in the June quarter 2008. For more information on the details of ARIMA modelling see the feature article 'Use of ARIMA modelling to reduce revisions' in the October 2004 issue of **Australian Economic Indicators** (cat. no. 1350.0).

## TREND ESTIMATES

**39** The trend is a measure of the underlying direction of a series. The ABS trend estimates for the WPI are derived by applying a 7-term Henderson-weighted moving average to all quarters of the respective seasonally adjusted indexes except the first three and last three quarters. Trend estimates are created for these quarters by applying surrogates of the 7-term Henderson weighted moving average to the seasonally adjusted indexes, tailored to each time series. In general, trend estimates give a better indication of underlying behaviour than the seasonally adjusted estimates. Please refer to the ABS Information Paper, **A Guide to Interpreting Time Series - Monitoring Trends** (cat. no. 1349.0).

**40** Increases in minimum wage rates contribute to the relative level (or trend) of the WPI. A review of the seasonally adjusted series was undertaken in the September quarter 2010 to remove the impacts of the different timing of the increases in minimum wage rates. A trend break correction has been applied between the June quarter and the September quarter 2009 to remove the shift in the underlying level as a result of no increase to minimum wage rates being awarded in 2009.

## INDEX REFERENCE PERIOD

**41** The index reference period of an index series is that period for which the value of the index is set to 100.0. From the September quarter 2009 issue of this publication the wage price indexes are calculated on an index reference period of 2008-09 = 100.0.

## REVISIONS TO INDEXES

**42** Original index numbers will be released as final figures at the time they are first published. Revisions will only occur in exceptional circumstances. Trend and seasonally adjusted indexes for some quarters will be revised as extra quarters are included in the series analysed for seasonal influences (see paragraphs 32 to 40).

## RELATED PUBLICATIONS

**43** Users may also wish to refer to the following publications which are available free on the ABS website <<https://www.abs.gov.au>>:

- Wage Price Index: Concepts, Sources and Methods**, (cat. no. 6351.0.55.001)
- Information Paper: Update on ANZSIC 2006 Implementation for Labour Price Index, Australia, 2009**, (cat. no. 6345.0.55.001)
- Consumer Price Index, Australia**, (cat. no. 6401.0)
- House Price Indexes, Eight Capital Cities**, (cat. no. 6416.0)
- International Trade Price Indexes, Australia**, (cat. no. 6457.0)
- Producer Price Indexes, Australia**, (cat. no. 6427.0)
- Australian Consumer Price Index: Concepts, Sources and Methods**, (cat. no. 6461.0)
- Producer and International Trade Price Indexes: Concepts, Sources and Methods**, (cat no. 6429.0)
- Australian Labour Market Statistics**, (cat. no. 6105.0)

**44** Current publications and other products released by the ABS are listed on the ABS website <<https://www.abs.gov.au>>. The ABS also issues a daily Release Advice on the website which details products to be released in the week ahead.

## **ABS DATA AVAILABLE ON REQUEST**

**45** As well as the statistics included in this and related publications, the ABS may have other relevant data available on request. Inquiries should be made to WPI on Perth (08) 9360 5151 or the National Information and Referral Service on 1300 135 070.

# **Glossary**

## **GLOSSARY**

### **Bonuses**

Payments made to a job occupant that are in addition to regular wages and salaries and which generally relate to the job occupant's, or the organisation's, performance. In the WPI, the term 'bonuses' refers to bonuses and commissions.

### **Elementary aggregates**

The finest aggregations of jobs, in terms of state/territory, sector and industry group, for which expenditure weights are available.

### **Employee job**

A job for which the occupant receives remuneration in wages, salary, payment in kind, or piece rates.

### **Employer**

Organisation with one or more employees.

### **Expenditure weights**

A measure of the relative importance of each elementary aggregate, based on employers' total expenditure on wages and salaries. Expenditure weights are used to combine elementary aggregate indexes into broader level indexes.

### **Index number**

Measures the ratio of the price of labour between the commencement of the index series and a later period.

### **Index reference period**

The period for which an index series is given the value of 100.0. The current index reference period for the WPI is the 2008-09 financial year.

### **Industry**

Classified according to the **Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006** (cat. no. 1292.0).

### **Ordinary time hourly rates of pay index**

Measures quarterly change in ordinary time hourly rates of pay (see Explanatory Notes paragraphs 7 and 8).

### **Ordinary time hours**

Award, standard or agreed hours of work paid for at the ordinary rate.

### **Overtime hours**

The number of hours paid for in excess of ordinary time hours.

### **Reference date**

The reference date for this survey is the last pay period ending on or before the third Friday of the middle month of the quarter, except for bonuses which are collected in respect to those paid during the three month period ending on the third Friday of the middle month of the quarter.

### **Sector**

Public sector comprises local government authorities and all government departments and agencies created by, or reporting to, the Commonwealth, or state/territory parliaments. The private sector comprises all organisations not classified as public sector.

### **Seasonal adjustment**

Process of removing systematic calendar related effects from the original series (see Explanatory Notes paragraphs 32-38, 42).

#### Total hourly rates of pay index

Measures quarterly change in combined ordinary time and overtime hourly rates of pay (see Explanatory Notes paragraph 10).

#### Trend

A measure of the underlying direction of a series (see Explanatory Notes paragraphs 39-40, 42).

#### Wage price index

Measures changes in the price of wages.

#### Weight reference period

The period to which the expenditure weights relate.

## Abbreviations

### ABBREVIATIONS

ABS	Australian Bureau of Statistics
WPI	Wage Price Index

## Distribution of expenditure on wages (Appendix)

### APPENDIX DISTRIBUTION OF EXPENDITURE ON WAGES

#### AS UPDATED DECEMBER QUARTER 2014

#### A1 DISTRIBUTION OF EMPLOYERS' EXPENDITURE ON WAGES(a)(b)

	Private %	Public %	Total %
Australia by sector			
Australia	77.6	22.4	100.0
Sector by State/Territory			
New South Wales	33.4	30.4	32.7
Victoria	23.3	21.8	23.0
Queensland	19.6	18.2	19.3
South Australia	5.6	6.8	5.9
Western Australia	14.2	11.4	13.6
Tasmania	1.5	2.4	1.7
Northern Territory	1.1	1.9	1.3
Australian Capital Territory	1.3	7.0	2.6
Australia	100.0	100.0	100.0
Sector by broad industry group(c)			
Mining	4.6	(d)	3.6
Manufacturing	9.9	(d)	7.7
Electricity, gas, water and waste services	0.9	4.4	1.7
Construction	11.5	(d)	9.0
Wholesale trade	6.8	(d)	5.3
Retail trade	8.3	(d)	6.5
Accommodation and food services	4.6	(d)	3.6
Transport, postal and warehousing	5.0	(d)	5.0
Information media and telecommunications	2.5	(d)	2.1
Financial and insurance services	6.6	(d)	5.4
Rental, hiring and real estate services	2.3	(d)	1.8
Professional, scientific and technical services	12.0	2.1	9.8
Administrative and support services	7.2	(d)	5.6
Public administration and safety	0.7	32.9	7.9
Education and training	4.1	27.7	9.4
Health care and social assistance	8.0	24.2	11.7
Arts and recreation services	1.3	(d)	1.2
Other services	3.7	(d)	2.9
All industries	100.0	100.0	100.0

(a) See paragraphs 20-25 of the Explanatory Notes.

(b) Components may not sum to 100.0 due to rounding.

(c) Classified according to the **Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006** (cat. no. 1292.0).

(d) For the Public sector, these industries are combined and included in the 'All industries' total.

## Time Series Spreadsheet (I-Note) - Time Series Spreadsheet

The wage price indexes in Tables 1, 2b, 3b, 4b, 5b, 7b, 8b and 9b are updated and released every quarter. The corresponding financial year wage price indexes in Tables 2a, 3a, 4a, 5a, 7a, 8a and 9a are updated and released each June quarter for the preceding financial year. There are no financial year indexes created for Table 1.

## Quality Declaration - Summary

### INSTITUTIONAL ENVIRONMENT

For information on the institutional environment of the Australian Bureau of Statistics (ABS), including the legislative obligations of the ABS, financing and governance arrangements, and mechanisms for scrutiny of ABS operations, please see ABS Institutional Environment.

### RELEVANCE

The Wage Price Index measures changes over time in the price of labour services, unaffected by changes in the quality and quantity of work performed (that is, indexes are unaffected by compositional change). It enables analysts and policy makers to assess the impact of changes in wage costs on the labour market, the economy more generally, households and the community. The survey results are used in formulating industrial relations, wages policies and economic analysis.

Wages and salaries account for the majority of expenditure on labour costs by employers. The 'headline' measure of the wage price index is the total hourly rates of pay excluding bonuses index. Wage price indexes are released for state and territory; sector (private/public) and broad industry groups.

Industry is classified according to the *Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006* (cat. no. 1292.0). Prior to the September quarter 2009, the ANZSIC 1993 version of the classification was used.

### TIMELINESS

Wage price indexes have been produced each quarter commencing from the September quarter 1997. The survey reference date is the last pay period ending on or before the third Friday of the middle month of the quarter, except for bonuses which are collected in respect to those paid during the three month period ending on the third Friday of the middle month of the quarter. Wage price indexes are released about three months after the reference date.

### ACCURACY

There are two principle sources of error in surveys, sampling error and non-sampling error. Non-sampling error arises from inaccuracies in collecting, recording and processing the data. Every effort has been made to reduce non-sampling error in the Wage Price Index by:

- careful design and testing of questionnaires and processing systems by providing instructions to businesses on how to select a sample of employee jobs
- detailed checking of completed survey forms
- instituting a range of procedures to ensure that jobs are priced to constant quality and quantity.

Sampling error occurs when a sample or subset of the population is surveyed rather than the entire population. One measure of the likely difference resulting from not including all of the population in the survey is given by the standard error. While the selection of employers and employee jobs are based on sampling techniques, standard errors are not available for the wage price index. While it is reasonably straightforward to calculate sampling errors for a level estimate such as the total number of employees jobs, it is not so straightforward to determine standard errors for the WPI which uses both sampling and index methodologies.

Original index numbers are released as final figures at the time they are first published. Revisions have never occurred and will only occur in exceptional circumstances. Trend and seasonally adjusted indexes are revised as extra quarters are included and seasonal factors are updated.

### COHERENCE

The methodology used to construct the WPI is similar to that used for other price indexes produced by the ABS such as the Consumer Price Index and the Producer Price Indexes. The sample for the WPI, is selected from the ABS Business Register which is primarily based on registrations to the Australian Taxation Office's Pay As You Go Withholding scheme.

Employers are classified to an industry using the *Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006* (cat. no. 1292.0). Up until June quarter 2009, the content and format of tables containing industry data reflected the 1993 version. Indexes for previous periods have been reproduced on an ANZSIC 2006 basis by reclassifying the businesses that reported data in earlier periods to the appropriate industry division of ANZSIC 2006. Index movements for Australia, state/territory, sector and All industries original series were not affected by the introduction of the new industry classification. Details about the change to

ANZSIC 2006 are outlined in *Information Paper: Update on ANZSIC 2006 Implementation for the Labour Price Index, Australia 2009* (cat. no. 6345.0.55.001).

The ABS conducts a number of sample surveys of businesses which collect information about wages and salaries. One of these series, Survey of Average Weekly Earnings (AWE), is designed to measure the level of average earnings in Australia at a point in time. Period to period movements for the AWE series are not comparable with those from the wage price index. The two series have different purposes. Consequently, they have different concepts, and use different sample selection and estimation methodologies.

## INTERPRETABILITY

The WPI publication (cat. no. 6345.0) contains Explanatory Notes, Appendices and a Glossary that provide information about data sources, terminology and other technical aspects of the series. More detailed information can also be found in the *Wages Price Index, Concepts, Sources and Methods* (cat. no. 6351.0.55.001).

The total hourly rates of pay excluding bonuses index Australia and sector level indexes are the only indexes of the WPI that are seasonally adjusted.

## ACCESSIBILITY

Additional wage price indexes are available on request. To make enquiries about such data, telephone WPI on Perth (08) 9360 5151 or email <[wage.price.index@abs.gov.au](mailto:wage.price.index@abs.gov.au)>

## Quality Declaration - Relevance

The target population of businesses for the WPI is all employing organisations in Australia (private and public sectors) excluding:

- enterprises primarily engaged in agriculture, forestry or fishing
- private households employing staff
- foreign embassies, consulates, etc.

A sample redesign of the WPI was undertaken and the outcome implemented from December quarter 2009. A result of this review was to stop collecting data on a quarterly basis from micro businesses (0-4 employment). The size and frequency of pay changes for jobs in micro businesses was found to be the same as businesses with employment of five or more. Therefore, micro businesses are now treated as being out of coverage of the WPI but remain in scope through their continued inclusion in the expenditure weights used in compiling the WPI. The introduction of this change has not impacted what the WPI is measuring.

All employee jobs in the target population of businesses are in scope of the WPI, with the exception of the following:

- Australian permanent defence force jobs
- non-maintainable jobs (i.e. jobs that are expected to be occupied for less than six months of a year)
- jobs for which wages and salaries are not determined by the Australian labour market (e.g. working proprietors of small incorporated enterprises, most employees of Community Development Employment Programs, and jobs where the remuneration is set in a foreign country).

## Quality Declaration - Accuracy

Information for the wage price indexes is collected each quarter by mail questionnaires from a sample survey of approximately 3,000 private and public sector employers selected from the ABS Business Register. These employers select a sample of jobs from their workplace(s) using instructions provided by the ABS. Approximately 18,000 jobs are priced each quarter.

## Quality Declaration - Interpretability

Seasonally adjusted estimates are derived by estimating and removing systematic calendar related effects from the original series. In most economic data these calendar related effects are a combination of seasonal influences e.g. the weather, social traditions or administrative practices plus other kinds of calendar related variations, such as the number of trading days, Easter or the proximity of significant days (e.g. Christmas).

Institutional effects largely drive the seasonality of the WPI. Important factors are the timing of effect of Australian workplace agreements and certified agreements, the length of these agreements, and the timing of the implementation of significant wage determinations that impact on rates of pay. A significant institutional change in wage setting arrangements can affect the relative level (or trend) and seasonality of the index.

The ABS has implemented improved methods of producing seasonally adjusted estimates, focussed on the application of Autoregressive Integrated Moving Average (ARIMA) modelling. Adoption of ARIMA modelling reduces the extent of revisions to the seasonally adjusted and trend estimates. For more information on the details of ARIMA modelling see feature article: **Use of ARIMA modelling to reduce revisions** in the October 2004 issue of **Australian Economic Indicators** (cat. no. 1350.0).

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